

PATENT ABSTRACTS OF JAPAN

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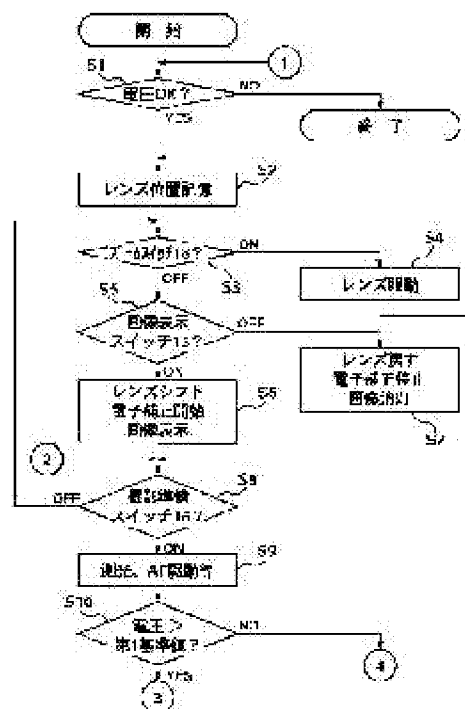
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(54) IMAGE PICKUP DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an image pickup device which can correct a blur of an image effectively with small power consumption.

SOLUTION: When a subject image is recorded, a blur of the subject image is optically corrected and when the subject image is displayed without being recorded, the blur of the subject image is corrected not optically, but through image signal processing.



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Notes:

1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1] A record means to record a photographic subject image, a display means to display a photographic subject image, and the 1st deflection amendment means that amends optically the deflection of said photographic subject image which said record means records, The 2nd deflection amendment means which amends the deflection of said photographic subject image which said display means displays by processing of a picture signal, Said 2nd amendment means is made to act without making said 1st amendment means act, when said display means displays said photographic subject image in the state where said record means does not record said photographic subject image. The imaging device characterized by having the control means on which said 1st amendment means is made to act when said record means records said photographic subject image.

[Claim 2] It is the imaging device according to claim 1 which has an image pick-up means to receive a photographic subject image and to change into a picture signal, and is characterized by said record means recording said photographic subject image based on the picture signal changed by said image pick-up means.

[Claim 3] Said display means is an imaging device according to claim 2 characterized by displaying said photographic subject image based on the picture signal changed by said image pick-up means.

[Claim 4] It is the imaging device according to claim 1 which has an image pick-up means to receive a photographic subject image and to change into a picture signal, and is characterized by said display means displaying said photographic subject image based on the picture signal changed by said image pick-up means.

[Claim 5] Said control means is an imaging device according to claim 1 to 4 characterized by making said 1st amendment means act where an operation of said 2nd amendment means is suspended, when said record means records said photographic subject image.

[Claim 6] The imaging device according to claim 2 to 5 characterized by having an image pick-up optical means for carrying out image formation of the photographic subject image to said image pick-up means.

[Claim 7] Have a photography preparation directions means to direct photography preparation, and a photographing start directions means to direct a photographing start, and [said control means] The imaging device according to claim 1 to 6 characterized by making said record means act with photographing start directions [means / said / photographing start directions] while making an operation of said 1st amendment means start with photography preparation directions [means / said / photography preparation directions].

[Claim 8] Said control means is an imaging device according to claim 7 characterized by stopping an operation of said 2nd amendment means with photography preparation directions [means / said / photography preparation directions].

[Claim 9] Have a photography preparation directions means to direct photography preparation, a photographing start directions means to direct a photographing start, and a deflection detection means for detecting the deflection state of a photographic subject image, and [said control means] While making operation of said deflection detection means start with photography preparation directions [means / said / photography preparation directions] The imaging device according to claim 1 to 6 characterized by making said record means act while making the operation according to the detection result of said deflection detection means of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[Claim 10] Said control means is an imaging device according to claim 9 characterized by stopping an operation of said 2nd amendment means with photographing start directions [means / said / photographing start directions].

[Claim 11] Said photography preparation directions means is an imaging device according to claim 7 to 10 characterized by the thing of photometry operation and auto-focusing operation for which either is directed at least as said photography preparation directions.

[Claim 12] The imaging device according to claim 7 to 11 characterized by having an operation means to make said photography preparation directions means act by the 1st-step operation of a series of operations, and to make said photographing start directions means act by the 2nd-step operation.

[Claim 13] Said operation means is an imaging device according to claim 12 characterized by being a shutter release member.

[Claim 14] It is the imaging device according to claim 1 to 11 which has a display instruction means to perform display start indication which makes said display means start the display of said photographic subject image, and is characterized by said 2nd amendment means starting an operation with the display start indication of said display instruction means.

[Claim 15] A dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, Have a photography preparation directions means to direct photography preparation, and a photographing start directions means to direct a photographing start, and [said control means] When the detection result of said dc-battery check means is beyond the 1st predetermined value The imaging device according to claim 1 to 6 characterized by making said record means act with photographing start directions [means / said / photographing start directions] while making an operation of said 1st amendment means start with photography preparation directions [means / said / photography preparation directions].

[Claim 16] [said control means] when the detection result of said dc-battery check means is beyond the predetermined value of under said 1st predetermined value 2nd While making operation of said deflection detection means start with photography preparation directions [means / said / photography preparation directions] The imaging device according to claim 15 characterized by making said record means act while making the operation according to the detection result of said deflection detection means of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[Claim 17] Said control means is an imaging device according to claim 16 characterized by making said record means act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions] when the detection result of said dc-battery check means is said under 2nd predetermined value.

[Claim 18] [said control means] when the detection result of said dc-battery check means is said under 2nd predetermined value The imaging device according to claim 16 characterized by making said record means act in the state where said 2nd amendment means was made to act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[Claim 19] [said control means] when the detection result of said dc-battery check means is beyond the predetermined value of under said 1st predetermined value 2nd The imaging device according to claim 15 characterized by making said record means act while making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[Claim 20] A dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, Have a photography preparation directions means to direct photography preparation, a photographing start directions means to direct a photographing start, and a deflection detection means for detecting the deflection state of a photographic subject image, and [said control means] When the detection result of said dc-battery check means is beyond the predetermined value of under the 1st predetermined value 2nd While making operation of said deflection detection means start with photography preparation

directions [means / said / photography preparation directions] The imaging device according to claim 1 to 6 characterized by making said record means act while making the operation according to the detection result of said deflection detection means of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[Claim 21] Said control means is an imaging device according to claim 20 characterized by making said record means act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions] when the detection result of said dc-battery check means is said under 2nd predetermined value.

[Claim 22] [said control means] when the detection result of said dc-battery check means is said under 2nd predetermined value The imaging device according to claim 20 characterized by making said record means act in the state where said 2nd amendment means was made to act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[Claim 23] Have a dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, and a photographing start directions means to direct a photographing start, and [said control means] The imaging device according to claim 1 to 6 characterized by making said record means act when the detection result of said *****_** check means is beyond the predetermined value of under the 1st predetermined value 2nd while making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[Claim 24] Have a dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, and a photographing start directions means to direct a photographing start, and [said control means] The imaging device according to claim 1 to 6 characterized by making said record means act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions] when the detection result of said dc-battery check means is under a predetermined value.

[Claim 25] Have a dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, and a photographing start directions means to direct a photographing start, and [said control means] The imaging device according to claim 1 to 6 characterized by making said record means act in the state where said 2nd amendment means was made to act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions] when the detection result of said dc-battery check means was under a predetermined value.

[Claim 26] When said 2nd amendment means acts, the photographing field angle of a photographing optical system is adjusted to the 2nd field angle by the side of a wide angle

from the 1st field angle. It is the imaging device according to claim 1 to 25 characterized by having the photographing field angle adjustment device returned to said 1st field angle from said 2nd field angle after said 2nd amendment means ends an operation.

[Claim 27] Said 2nd amendment means is an imaging device according to claim 1 to 25 characterized by acting only on the center side from the predetermined range in the display screen of said display means.

[Claim 28] Said display means is an imaging device according to claim 1 to 25 characterized by indicating the photographic subject image in the state where said 2nd amendment means does not act at the same time it, on the whole, displays the photographic subject image in the state where said 2nd amendment means acted on a display screen by reduction at said a part of display screen.

[Claim 29] A record means to record a photographic subject image, a display means to display a photographic subject image, and the 1st deflection amendment means that amends optically the deflection of said photographic subject image which said record means records, The 2nd deflection amendment means which amends the deflection of said photographic subject image which said display means displays by processing of a picture signal, Said 2nd amendment means is made to act without making said 1st amendment means act in the display mode as which said display means displays said photographic subject image in the state where said record means does not record said photographic subject image. The imaging device characterized by having the control means on which answer that said record means shifts to the record mode which records said photographic subject image, and said 1st amendment means is made to act.

[Claim 30] It is the imaging device according to claim 29 which has an image pick-up means to receive a photographic subject image and to change into a picture signal, and is characterized by said record means recording said photographic subject image based on the picture signal changed by said image pick-up means.

[Claim 31] Said display means is an imaging device according to claim 30 characterized by displaying said photographic subject image based on the picture signal changed by said image pick-up means.

[Claim 32] It is the imaging device according to claim 29 which has an image pick-up means to receive a photographic subject image and to change into a picture signal, and is characterized by said display means displaying said photographic subject image based on the picture signal changed by said image pick-up means.

[Claim 33] Said control means is an imaging device according to claim 29 to 32 characterized by answering shifting to said record mode from said display mode, suspending an operation of said 2nd amendment means, and making an operation of said 1st amendment means start.

[Claim 34] The deflection of the photographic subject image recorded is optically set by the 1st

deflection amendment means to the imaging device which can be amended. A record means to record a photographic subject image, a display means to display a photographic subject image, and the 2nd deflection amendment means that amends the deflection of said photographic subject image which said display means displays by processing of a picture signal, Said 2nd amendment means is made to act without making said 1st amendment means act, when said display means displays said photographic subject image in the state where said record means does not record said photographic subject image. The imaging device characterized by having the control means on which said 1st amendment means is made to act when said record means records said photographic subject image.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the imaging device which can amend the deflection of the image shot by an image pick-up person's hand deflection etc. about an imaging device.

[0002]

[Description of the Prior Art] In order to prevent conventionally the bad influence to the image shot by deflections, such as a photography person's hand deflection produced at the time of photography, many video cameras, film-based cameras, etc. incorporating a deflection amendment function in a commercial scene are offered.

[0003] By taking out the picture signal generated by image sensors, such as CCD, and changing the range which carries out image display according to the deflection of a camera, if these deflection amendment functions are divided roughly What is called an electronic amendment method that displays a picture without a deflection, and sensors, such as a vibration gyroscope, detect a deflection, and based on the result, change the vertical angle of a variable vertical angle prism, or some taking lenses are shifted. It is classified what is called into an optical amendment method which prevents that a photography image sways on an imaging surface.

[0004] If an outline is explained about both this method, an electronic amendment method stores this picture signal temporarily by a field memory first, after processing the picture signal outputted from the imaging optical system. And the picture signal of the previous field memorized by the picture signal and field memory of the present field outputted from the imaging optical system after that is compared, the amount of deflections from a previous field is calculated, a picture read-out position is shifted at any time, and a deflection is amended so that the amount of deflections may be canceled. This electronic amendment method is mainly used as deflection amendment of video, such as a video camera, until now.

[0005] On the other hand, an optical amendment method forms the angular velocity sensor which detects a deflection on the main part of photography equipment, shifts an optical axis in optical-axis amendment parts, such as a variable prism formed into the optical path of an imaging optical system based on the angular velocity signal acquired from there, and amends the deflection on an image formation face. Since there is no degradation of the image shot by correction operation and the degree of optic angle can be amended to the deflection angle of a camera body regardless of a focal length if it is this method, it is possible especially to remove a deflection good also in the case of a long focal length, and it has the performance exceeding the former method in respect of quality of image. This optical amendment method is mainly used for deflection amendment of still pictures, such as a film-based camera.

[0006] By the way, instead of a silver halide film, what is called a digital camera that picturizes a still picture with image sensors, such as CCD, has spread in recent years. A digital camera is the new commercial-scene field which is growing rapidly by high definition-ization by the needs amplification to the digital image by the spread of personal computers, and progress of various device technology, such as CCD.

[0007] Drawing 8 is drawing showing the outline composition of the conventional digital camera.

[0008] 101 in drawing is a camera body and 102 is an imaging optical system. The photographic subject image from the imaging optical system 102 is changed into a picture signal with the image sensor 103. After various processings are performed through the A/D conversion part 104 or the signal conditioning part 105, it is saved at the Records Department 106, such as a memory card, and the picture which the image sensor 103 which includes the picture saved in the image display parts 107, such as a monitor, captured can be checked. Among these composition, the imaging optical system 102 has a function similar to the conventional film-based camera, and the thing of composition of that the signal conditioning part 105 and the display part 107 grade were similar to the video camera exists.

[0009]

[Problem to be solved by the invention] The deflection Method of amendment of the above-mentioned imaging device has two, an electronic amendment method and an optical amendment method, as mentioned above, but demerit is in each.

[0010] In order that it may be a precondition to acquire an imaging signal with image sensors, such as CCD, and an electronic amendment method may throw away a part for a periphery among the whole picture at the time of deflection amendment and may perform amplification read-out (electronic zoom), while the picture after amendment is on a looking-far side from the photographing field angle of an optical system, it has a fault accompanied by degradation of quality of image.

[0011] On the other hand, an optical amendment method has the problem of taking big power

consumption for starting of deflection detection sensors, such as a gyro sensor, to take time, and to drive them.

[0012] Moreover, the digital camera which is a kind of an imaging device can carry out the monitor display of the video at any time like a video camera at the time of observation of a photographic subject image, and needs to record a still picture by high definition like a film-based camera at the time of photography.

[0013] This invention is made in view of the above situation, and aims at offering the imaging device which can perform deflection amendment of a picture effectively with little power dissipation.

[0014]

[Means for solving problem] In order to attain the above-mentioned purpose, [the imaging device of Claim 1] A record means to record a photographic subject image, a display means to display a photographic subject image, and the 1st deflection amendment means that amends optically the deflection of said photographic subject image which said record means records, The 2nd deflection amendment means which amends the deflection of said photographic subject image which said display means displays by processing of a picture signal, Said 2nd amendment means is made to act without making said 1st amendment means act, when said display means displays said photographic subject image in the state where said record means does not record said photographic subject image. When said record means records said photographic subject image, it is characterized by having the control means on which said 1st amendment means is made to act.

[0015] It has an image pick-up means for the imaging device of Claim 2 to receive a photographic subject image in an imaging device according to claim 1, and to change into a picture signal, and said record means is characterized by recording said photographic subject image based on the picture signal changed by said image pick-up means.

[0016] The imaging device of Claim 3 is characterized by said display means displaying said photographic subject image based on the picture signal changed by said image pick-up means in an imaging device according to claim 2.

[0017] It has an image pick-up means for the imaging device of Claim 4 to receive a photographic subject image in an imaging device according to claim 1, and to change into a picture signal, and said display means is characterized by displaying said photographic subject image based on the picture signal changed by said image pick-up means.

[0018] In an imaging device according to claim 1 to 4, the imaging device of Claim 5 is characterized by making said 1st amendment means act, where an operation of said 2nd amendment means is suspended by said control means, when said record means records said photographic subject image.

[0019] The imaging device of Claim 6 is characterized by having an image pick-up optical

means for carrying out image formation of the photographic subject image to said image pick-up means in an imaging device according to claim 2 to 5.

[0020] The imaging device of Claim 7 is set to an imaging device according to claim 1 to 6. Have a photography preparation directions means to direct photography preparation, and a photographing start directions means to direct a photographing start, and [said control means] While making an operation of said 1st amendment means start with photography preparation directions [means / said / photography preparation directions], it is characterized by making said record means act with photographing start directions [means / said / photographing start directions].

[0021] The imaging device of Claim 8 is characterized by said control means stopping an operation of said 2nd amendment means with photography preparation directions [means / said / photography preparation directions] in an imaging device according to claim 7.

[0022] The imaging device of Claim 9 is set to an imaging device according to claim 1 to 6. Have a photography preparation directions means to direct photography preparation, a photographing start directions means to direct a photographing start, and a deflection detection means for detecting the deflection state of a photographic subject image, and [said control means] While making operation of said deflection detection means start with photography preparation directions [means / said / photography preparation directions], and making the operation according to the detection result of said deflection detection means of said 1st amendment means start with photographing start directions [means / said / photographing start directions], it is characterized by making said record means act.

[0023] The imaging device of Claim 10 is characterized by said control means stopping an operation of said 2nd amendment means with photographing start directions [means / said / photographing start directions] in an imaging device according to claim 9.

[0024] As for the imaging device of Claim 11, in an imaging device according to claim 7 to 10, said photography preparation directions means is characterized by the thing of photometry operation and auto-focusing operation for which either is directed at least as said photography preparation directions.

[0025] The imaging device of Claim 12 is characterized by having an operation means to make said photography preparation directions means act by the 1st-step operation of a series of operations, and to make said photographing start directions means act by the 2nd-step operation in an imaging device according to claim 7 to 11.

[0026] The imaging device of Claim 13 is characterized by said operation means being a shutter release member in an imaging device according to claim 12.

[0027] The imaging device of Claim 14 has a display instruction means to perform display start indication which makes said display means start the display of said photographic subject image in an imaging device according to claim 1 to 11, and said 2nd amendment means is

characterized by starting an operation with the display start indication of said display instruction means.

[0028] The imaging device of Claim 15 is set to an imaging device according to claim 1 to 6. A dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, Have a photography preparation directions means to direct photography preparation, and a photographing start directions means to direct a photographing start, and [said control means] When the detection result of said dc-battery check means is beyond the 1st predetermined value, while making an operation of said 1st amendment means start with photography preparation directions [means / said / photography preparation directions], it is characterized by making said record means act with photographing start directions [means / said / photographing start directions].

[0029] In an imaging device according to claim 15, the imaging device of Claim 16 [said control means] When the detection result of said dc-battery check means is beyond the predetermined value of under said 1st predetermined value 2nd While making operation of said deflection detection means start with photography preparation directions [means / said / photography preparation directions], and making the operation according to the detection result of said deflection detection means of said 1st amendment means start with photographing start directions [means / said / photographing start directions], it is characterized by making said record means act.

[0030] In an imaging device according to claim 16, the imaging device of Claim 17 [said control means] When the detection result of said dc-battery check means is said under 2nd predetermined value, it is characterized by making said record means act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[0031] In an imaging device according to claim 16, the imaging device of Claim 18 [said control means] When the detection result of said dc-battery check means is said under 2nd predetermined value, it is characterized by making said record means act in the state where said 2nd amendment means was made to act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[0032] In an imaging device according to claim 15, the imaging device of Claim 19 [said control means] When the detection result of said dc-battery check means is beyond the predetermined value of under said 1st predetermined value 2nd, while making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions], it is characterized by making said record means act.

[0033] The imaging device of Claim 20 is set to an imaging device according to claim 1 to 6. A dc-battery check means to detect the level of the power supply battery which drives said 1st

amendment means, Have a photography preparation directions means to direct photography preparation, a photographing start directions means to direct a photographing start, and a deflection detection means for detecting the deflection state of a photographic subject image, and [said control means] When the detection result of said dc-battery check means is beyond the predetermined value of under the 1st predetermined value 2nd While making operation of said deflection detection means start with photography preparation directions [means / said / photography preparation directions], and making the operation according to the detection result of said deflection detection means of said 1st amendment means start with photographing start directions [means / said / photographing start directions], it is characterized by making said record means act.

[0034] In an imaging device according to claim 20, the imaging device of Claim 21 [said control means] When the detection result of said dc-battery check means is said under 2nd predetermined value, it is characterized by making said record means act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[0035] In an imaging device according to claim 20, the imaging device of Claim 22 [said control means] When the detection result of said dc-battery check means is said under 2nd predetermined value, it is characterized by making said record means act in the state where said 2nd amendment means was made to act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[0036] The imaging device of Claim 23 is set to an imaging device according to claim 1 to 6. Have a dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, and a photographing start directions means to direct a photographing start, and [said control means] When the detection result of said dc-battery check means is beyond the predetermined value of under the 1st predetermined value 2nd, while making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions], it is characterized by making said record means act.

[0037] The imaging device of Claim 24 is set to an imaging device according to claim 1 to 6. Have a dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, and a photographing start directions means to direct a photographing start, and [said control means] When the detection result of said dc-battery check means is under a predetermined value, it is characterized by making said record means act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[0038] The imaging device of Claim 25 is set to an imaging device according to claim 1 to 6.

Have a dc-battery check means to detect the level of the power supply battery which drives said 1st amendment means, and a photographing start directions means to direct a photographing start, and [said control means] When the detection result of said dc-battery check means is under a predetermined value, it is characterized by making said record means act in the state where said 2nd amendment means was made to act without making an operation of said 1st amendment means start with photographing start directions [means / said / photographing start directions].

[0039] The imaging device of Claim 26 is set to an imaging device according to claim 1 to 25. When said 2nd amendment means acts, after it adjusts the photographing field angle of a photographing optical system to the 2nd field angle by the side of a wide angle from the 1st field angle and said 2nd amendment means ends an operation, it is characterized by having the photographing field angle adjustment device returned to said 1st field angle from said 2nd field angle.

[0040] It is characterized by acting only on the center side from the predetermined range [in / on an imaging device according to claim 1 to 25 and / imaging device / of Claim 27 / in said 2nd amendment means / the display screen of said display means].

[0041] In an imaging device according to claim 1 to 25, the imaging device of Claim 28 [said display means] It is characterized by indicating the photographic subject image in the state where said 2nd amendment means does not act by reduction at said a part of display screen at the same time it, on the whole, displays the photographic subject image in the state where said 2nd amendment means acted on a display screen.

[0042] A record means by which the imaging device of Claim 29 records a photographic subject image, and a display means to display a photographic subject image, The 1st deflection amendment means which amends optically the deflection of said photographic subject image which said record means records, The 2nd deflection amendment means which amends the deflection of said photographic subject image which said display means displays by processing of a picture signal, Said 2nd amendment means is made to act without making said 1st amendment means act in the display mode as which said display means displays said photographic subject image in the state where said record means does not record said photographic subject image. It is characterized by having the control means on which answer that said record means shifts to the record mode which records said photographic subject image, and said 1st amendment means is made to act.

[0043] It has an image pick-up means for the imaging device of Claim 30 to receive a photographic subject image in an imaging device according to claim 29, and to change into a picture signal, and said record means is characterized by recording said photographic subject image based on the picture signal changed by said image pick-up means.

[0044] The imaging device of Claim 31 is characterized by said display means displaying said

photographic subject image based on the picture signal changed by said image pick-up means in an imaging device according to claim 30.

[0045] It has an image pick-up means for the imaging device of Claim 32 to receive a photographic subject image in an imaging device according to claim 29, and to change into a picture signal, and said display means is characterized by displaying said photographic subject image based on the picture signal changed by said image pick-up means.

[0046] In an imaging device according to claim 29 to 32, the imaging device of Claim 33 answers that said control means shifts to said record mode from said display mode, suspends an operation of said 2nd amendment means, and is characterized by making an operation of said 1st amendment means start.

[0047] The imaging device of Claim 34 sets the deflection of the photographic subject image recorded optically by the 1st deflection amendment means to the imaging device which can be amended. A record means to record a photographic subject image, a display means to display a photographic subject image, and the 2nd deflection amendment means that amends the deflection of said photographic subject image which said display means displays by processing of a picture signal, Said 2nd amendment means is made to act without making said 1st amendment means act, when said display means displays said photographic subject image in the state where said record means does not record said photographic subject image. When said record means records said photographic subject image, it is characterized by having the control means on which said 1st amendment means is made to act.

[0048]

[Mode for carrying out the invention] The form of operation of this invention is hereafter explained with reference to Drawings.

[0049] (1) Form drawing 1 of the 1st operation is drawing showing the composition of the digital camera 100 of deflection amendment functional loading concerning the form of operation of the 1st of this invention. 1 is an imaging lens which carries out image formation of the photographic subject image optically and in which a zoom is possible, and 2 is a lens control part constituted by the encoder which detects the motor and reduction gears which move [focus-] or move [zoom-] the imaging lens 1, and a focal position or a zoom position. Moreover, although 3 is an optical deflection amendment part which shifts the optical axis of the imaging lens 1 and amends a deflection, it mentions this detail later.

[0050] Next, 4 is image sensors, such as CCD which receives the photographic subject image by which image formation was carried out, and is changed into an analog picture signal, 5 is an A/D conversion part which changes into digital one the picture signal outputted from the image sensor 4 from an analog, and 6 is a signal conditioning part which carries out various kinds of processings to the signal changed in the A/D conversion part 5. Moreover, 7 is an electronic deflection amendment part and also mentions this later for details. 8 is an image recording part

which records a picture signal, 9 is an image display control part which changes into the state which can display a picture signal, or changes a display, and 10 is an image display part which displays a picture.

[0051] Subsequently, 11 is a power supply battery which supplies the power supply to each part, 12 is a voltage detecting element which checks the voltage of the power supply battery 11, and 13 is a whole control part which consists of microcomputers which control the whole camera. Moreover, through the control part 13, 14 is various kinds of operation directions the control unit to give, and in this the image display switch 15 which directs the display of a picture in the image display control part 9, the photography preparation switch 16 which directs preparation of photography to the whole camera, and the photographing start switch 17 which similarly directs the start of photography -- and The zoom switch 18 which changes the photographing field angle of the imaging lens 1, and other various switches (not shown) are included. In addition, the photography preparation switch 16 and the photographing start switch 17 consist of integral-type push button type switches which can operate by a series of push operations of a shutter release member.

[0052] Next, the composition of the optical deflection amendment part 3 is explained.

[0053] 19 in drawing 1 is an angular velocity sensor which detects the vertical deflection angular velocity and lateral deflection angular velocity of a camera, and 20 is an integration treatment part which integrates with and carries out the A/D conversion of the output from the angular velocity sensor 19, and outputs the amount signal of angular displacement of vibration. Moreover, 21 is optical-axis amendment parts, such as a variable vertical angle prism formed into the optical path of the imaging lens 1, and 22 is an actuator, it drives the optical-axis amendment part 21 according to the output of the integration treatment part 20, shifts the optical axis of the imaging lens 1 to length and a cross direction, and amends the deflection of the photographic subject image on the image sensor 4.

[0054] Next, the composition of the electronic deflection amendment part 7 is explained.

[0055] 23 in drawing 1 is a field memory which saves temporarily the digital signal sent from the signal conditioning part 6. 24 is a memory control part which controls the signal input/output to the field memory 23, and 25 is a motion detecting element which compares the signal of the present field outputted from the signal conditioning part 6 with the signal of the previous field saved in the field memory 23, and calculates the amount of motions from a previous field. Moreover, 26 moves, it is an amendment part, and based on the information on the motion detecting element 25, shifts a picture read-out position at any time, and performs amplification processing of the whole screen so that the amount of motions may be canceled. In addition, the electronic deflection amendment part 7 outputs the inputted picture signal as it is through, when swaying and omitting the amendment operation.

[0056] Operation of the digital camera 100 constituted as mentioned above is explained along

with the flow chart of drawing 2 and drawing 3 .

[0057] First, if a control unit 14 is operated and the power supply of a digital camera 100 is switched on, the whole control part 13 will check the voltage of the power supply battery 11 through the voltage detecting element 12, and it will be judged whether this voltage is voltage proper in operation of a digital camera 100 (Step S1). If it is judged that this voltage is proper, first, the lens control part 2 will detect the zoom position of the imaging lens 1, it will be memorized (Step S2), and it will be checked whether next operation of a zoom switch 18 is performed (Step S3). While operation of a zoom switch 18 is performed, the lens drive of the imaging lens 1 is carried out by the lens control part 2 (Step S4), and a zoom position is rememorized.

[0058] When operation of a zoom switch 18 is not performed When it checks whether operation of the image display switch 15 is performed (Step S5) and operation of the image display switch 15 is performed It shifts to a wide side from the position which memorized the imaging lens 1 previously by the lens control part 2 first. In the electronic deflection amendment part 7, the picture signal which took in the picture signal from the image sensor 4, and was [this picking] crowded with these states sways, is amended, and displays that picture that deflection amendment processing was carried out and was expanded to an equivalent for the zoom position of origin on the image display part 10 (Step S6). At Step S5, when the image display switch 15 is not operated, the imaging lens 1 is returned to the original position, deflection amendment in the electronic deflection amendment part 7 is suspended, and the image display in the image display part 10 is terminated (Step S7).

[0059] Next, when it checks whether operation of the photography preparation switch 16 is performed (Step S8) and operation of the photography preparation switch 16 is not performed, it stands by, returning to Step S3 and repeating old operation. When operation of the photography preparation switch 16 is performed, it confirms whether be over 1st sufficient fiducial point to perform photography preparation control of photometry, AF (auto-focusing) drive, etc. (Step S9), and for the voltage of the power supply battery 11 perform optical deflection amendment after that (Step S10). When it is over the 1st fiducial point, the angular velocity sensor 19 is driven first (Step S11). Then, it distinguishes whether electronic deflection amendment is performed (Step S12), and if it is not carrying out, on the other hand, processing of Step S13 is skipped that origin returns a part for the above-mentioned zoom position shift of the imaging lens 1 (Step S13), at the same time it will stop it, if it is carrying out.

[0060] And vibration of the length and the cross direction which the angular velocity sensor 19 and the integration treatment part 20 are operated, and are added to camera 100 main part is detected, the optical-axis amendment part 21 is driven through an actuator 22, the optical axis of the taking lens 1 is shifted in the direction in every direction, and the deflection of the photographic subject image on the image sensor 4 is amended (Step S14).

[0061] Next, predetermined time standby is carried out until operation of the photographing start switch 17 is performed (Step S18). Since the photographing start switch 17 can be operated only by carrying out a push operation to the push operation of the photography preparation switch 16 further continuously at this time, operation is easy and can shift to the start of photography promptly after the completion of photography preparation. If operation of the photographing start switch 17 is performed into predetermined time while returning to Step S8, when operation of the photographing start switch 17 is not performed into predetermined time, the whole control part 13 will control the image sensor 4, and will picturize by driving the shutter which otherwise is not illustrated (Step S19). As for under photographing operation, more than in the case of 1st sufficient fiducial point for the voltage of the power supply battery 11 to perform optical deflection amendment, at this time, high definition deflection amendment is performed by optical deflection amendment based on the result of the voltage check (Step S10) mentioned above.

[0062] And if an image pick-up is completed, a picture signal will be recorded on the image recording part 8, the picture of the picture signal will be displayed on the image display part 10 through the display control part 9 (Step S20), and it will return to Step S1. Therefore, it sways and the effect of correction operation can be checked immediately after photography.

[0063] In Step S10, when the voltage of the power supply battery 11 is the 1st less than fiducial point, it confirms whether be the 2nd less than fiducial point indispensable for the voltage of the power supply battery 11 to perform optical deflection amendment (Step S15). When the voltage of the power supply battery 11 is the 2nd less than fiducial point It is judged that a series of deflection amendments of all to photography are performed by electronic deflection amendment since optical deflection amendment cannot be performed. It checks whether electronic deflection amendment is performed first (Step S16), when electronic deflection amendment is omitted yet, the taking lens 1 is shifted like the above-mentioned step S6, electronic deflection amendment is started (Step S17), and Steps S18-S20 are performed.

[0064] Next, in Step S15, processing in case the voltage of the power supply battery 11 is the 2nd more than fiducial point is explained. Although the power supply battery 11 is exhausted to some extent, this corresponds, when optical deflection amendment is still possible.

[0065] In this case, only the oscillating detection of length and a cross direction which the angular velocity sensor 19 and the integration treatment part 20 which start detection preparation among optical deflection correction operation first as for time are operated, and is added to camera 100 main part is started (Step S21). In addition, if electronic deflection correction operation is performed, it will be made to continue as it is at this time. And predetermined time standby is carried out until operation of the photographing start switch 17 is performed (Step S22). If operation of the photographing start switch 17 is performed into predetermined time while returning to Step S8, when operation of the photographing start

switch 17 is not performed into predetermined time It checks whether electronic deflection amendment is performed (Step S23), and if it is not carrying out, on the other hand, processing of Step S24 is skipped that origin returns a shifted part of the imaging lens 1 (Step S24), at the same time it will stop it, if it is carrying out. And the optical-axis amendment part 21 is driven through an actuator 22, the optical axis of the taking lens 1 is shifted in the direction in every direction, the deflection of the photographic subject image on the image sensor 4 is amended (Step S25), and it progresses to Step S19. Thus, in the photography preparatory step, it is power saving more and optical deflection amendment photography is made to be performed by starting only necessary minimum deflection detection operation at the time of a photographing start promptly.

[0066] Next, the contents of amendment of electronic deflection amendment are explained in detail, referring to drawing 4 .

[0067] First, although the picture signal sent from the signal conditioning part 6 is saved in the field memory 23 temporarily, in drawing, a is the picture field saved at this time, and this is equivalent to the imaging region obtained from the image sensor 4. And b is the picture read from the field memory 23, and this is the field which omitted the periphery of the imaging region obtained from the image sensor 4, and extracted only the center section, and becomes equivalent to the picture field obtained by turning on an imaging lens 1 looking-far-side exactly. Thus, [repeating operation which saves the whole picture field temporarily and extracts the portion] Amendment processing of a picture deflection is performed by calculating the length of an image shot, and the amount of motions of a cross direction from correlation with the saved picture information and the picture information of the following frame, moving like b' the field which carries out picture extraction according to this amount of motions, and extracting. However, since the picture acquired in this way turns into a picture by the side of looking far (b2) like drawing 5 (B) rather than the picture in early stages of the imaging lens 1 (a1), As shown in drawing 5 (A), the image (a2) which shifted the field angle of the part imaging lens 1 to the wide angle side, and extended the imaging region is captured, and as shown in drawing 5 (C), it is made equivalent to the picture (a1) (drawing 5 (B)) of the first stage when not amending the picture after electronic deflection amendment processing (b2). Thus, a picture equivalent to a desired field angle can be acquired by using the shift action of a taking lens together at the time of electronic deflection amendment.

[0068] As mentioned above, when the image recording part 8 does not record the picture signal outputted from the signal conditioning part 6 according to the form of this operation [the picture signal amended by the electronic deflection amendment part 7 / that (Step S6) which is displayed on the image display part 10] At the time of un-taking [which performs only observation of a photographic subject] a photograph, little electronic deflection amendment of power dissipation can be performed. When the image recording part 8 records the picture

signal outputted from the signal conditioning part 6, (Step S14, Step S25), Since the image recording part 8 records the picture signal acquired when the optical axis of the imaging lens 1 was amended by the optical-axis amendment part 21, optical deflection amendment for acquiring a picture [high definition / at the time of photography] can be performed.

[0069] Moreover, the correction operation by electronic deflection amendment is started by operation of the image display switch 15 (Step S6). Suspend the correction operation by electronic deflection amendment by operation of the photography preparation switch 16, and the correction operation by optical deflection amendment is started (Step S14). Since the image recording part 8 records a picture signal by operation (Step S18) of the photographing start switch 17 Little electronic deflection amendment of power dissipation can be performed at the time of un-taking [which performs only observation of a photographic subject] a photograph, the effect of optical deflection amendment [still high definition / before / photography] can be observed, and the high definition picture by which optical deflection amendment was carried out can be photoed without a time lag at the time of photography.

[0070] Moreover, the correction operation by electronic deflection amendment is started by operation of the image display switch 15 (Step S6). Start (Step S21) and only the oscillating detection of length and a cross direction added to camera 100 main part without starting optical deflection correction operation by operation of the photography preparation switch 16 [with operation of the photographing start switch 17] the optical-axis correction operation of the imaging lens 1 by the optical-axis amendment part 21 suspend the correction operation by electronic deflection amendment (Step S24), and corresponding to the detection result of said vibration -- starting (Step S25) -- Since the image recording part 8 records a picture signal, in a photography preparatory step, only oscillating detection operation which time requires for detection preparation can be performed, it can be made power saving more, and the high definition picture by which optical deflection amendment was carried out at the time of a photographing start can be photoed without a time lag.

[0071] Moreover, the correction operation by electronic deflection amendment is started by operation of the image display switch 15 (Step S6). More than in the case of 1st sufficient fiducial point for the voltage detected by the voltage detecting element 12 to perform optical deflection amendment, at the (step S10 YES), [suspend the correction operation by electronic deflection amendment by operation of the photography preparation switch 16, start the correction operation by optical deflection amendment (Step S14), and / with operation of the photographing start switch 17] since the image recording part 8 records a picture signal When little electronic deflection amendment of power dissipation can be performed in the stage of performing only observation of a photographic subject and that a photograph is not taken and a margin is in voltage, the high definition picture by which optical deflection amendment was carried out can be photoed without a time lag, observing the effect of high definition optical

deflection amendment by photography before.

[0072] Moreover, it is the 2nd more than fiducial point indispensable for the voltage detected by the voltage detecting element 12 to perform optical deflection amendment. Less than in the case of 1st sufficient fiducial point to perform optical deflection amendment, at the (step S15 NO), After starting the correction operation by electronic deflection amendment by operation of the image display switch 15, Start (Step S21) and only the oscillating detection of length and a cross direction added to camera 100 main part without starting optical deflection correction operation by operation of the photography preparation switch 16 [with operation of the photographing start switch 17] the optical-axis correction operation of the imaging lens 1 by the optical-axis amendment part 21 suspend the correction operation by electronic deflection amendment, and corresponding to the detection result of said vibration -- starting (Step S25) -- Since the image recording part 8 records a picture signal, when little electronic deflection amendment of power dissipation can be performed in the stage of performing only observation of a photographic subject and that a photograph is not taken and there is no margin in voltage Stopping power dissipation without performing optical deflection amendment just before photography, only oscillating detection operation which time requires for detection preparation can be performed, and the high definition picture by which optical deflection amendment was carried out at the time of a photographing start can be photoed without a time lag.

[0073] Less than in the case of the 2nd fiducial point indispensable for the voltage detected by the voltage detecting element 12 to perform optical deflection amendment, at the (step S15 Moreover, YES), The object image by which electronic deflection amendment was carried out can be photoed stopping power dissipation, since the image recording part 8 records the picture signal concerned while the image display part 10 displays the picture signal amended by the electronic deflection amendment part 7.

[0074] Moreover, during the correction operation by the electronic deflection amendment part 7 When the lens control part 2 shifts to the imaging lens 1 looking-far-side (Step S6) and cancels the correction operation by the electronic deflection amendment part 7 Also when the lens control part 2 performs electronic deflection amendment by that which returns the imaging lens 1 to the original position (Step S7), even if it can photo a desired picture, without the periphery of an image shot being missing and takes a photograph by optical deflection amendment after that, the picture as a request can be photoed.

[0075] (2) That the form of operation of the form 2nd of the 2nd operation differs from the form of the 1st operation is the point of performing an image synthesizing process instead of the shift of an imaging lens to the time of electronic deflection amendment in a photography preparatory step.

[0076] Since the composition of the camera concerning the form of the 2nd operation is the same as the composition of the camera 100 mentioned above, the description is omitted.

[0077] The contents of amendment of electronic deflection amendment are explained in detail hereafter, referring to drawing 6 .

[0078] When a photographic subject is photoed with the imaging lens 1, the photoed picture (a3) is saved in the field memory 23 temporarily. This picture is read after that, the motion detecting element 25 calculates the amount of correlation lost motion with the picture information of the following frame, and the motion amendment part 26 in the electronic deflection amendment part 17 performs amendment processing of a picture deflection. In this way, the picture (b3) acquired becomes what omitted the periphery (c) from the early picture (a3), and extracted only the center section. Although it is the same as that of electronic deflection amendment of the form of the 1st operation so far next, in the motion amendment part 26, synthetic processing of the periphery (c) omitted at the time of deflection amendment is carried out, a whole image is reproduced, and it displays on the image display means 10. In this way, the display image (d) obtained turns into a picture (b3) which the center section swayed and was amended, and a picture (c) by which a periphery is not amended (drawing 6 (B)). In addition, about operation of the camera 100 in this case, if the lens shift action of electronic deflection amendment of Step S6 in drawing 2 and the flow chart of drawing 3 , Step S13, Step S17, and Step 24 is replaced with picture composition operation, the flow chart of drawing 2 and drawing 3 is applicable.

[0079] If constituted as mentioned above, even if it does not shift the imaging lens 1 to the wide angle side, a picture equivalent to a desired field angle can be acquired only by electronic deflection amendment, the time and electric power which a lens shift drive takes can be lessened more, or deterioration of quality of image can be prevented. In addition, what is necessary is just to return to electronic deflection amendment of the form of the 1st operation at the time of a photographing start to acquire the picture which does not have a deflection to a periphery as an image shot.

[0080] (3) It is the method of an image synthesizing process that the form of operation of the form 3rd of the 3rd operation differs from the form of the 2nd operation.

[0081] Since the composition of the camera concerning the form of the 3rd operation is the same as the composition of the camera 100 mentioned above, the description is omitted.

[0082] The contents of amendment of electronic deflection amendment are explained in detail hereafter, referring to drawing 7 .

[0083] When a photographic subject is photoed with the imaging lens 1, the photoed picture (a4) is saved in the field memory 23 temporarily. This picture is read after that, the motion detecting element 25 calculates the amount of correlation lost motion with the picture information of the following frame, and the motion amendment part 26 performs amendment processing of a picture deflection. In this way, the picture (b4) acquired becomes what omitted the periphery from the early picture (a4), and extracted only the center section. Although it is

the same as that of the form of the 1st operation at the point which does not carry out a lens shift so far next, in the motion amendment part 26, the picture before deflection amendment (a4) is reduced, and synthetic processing is carried out and it displays on the picture after amendment (b4) to the image display means 10. In this way, the amplification picture swayed and amended by the whole is displayed and the display image obtained will be in the state where a reduction indication of the whole image which is not amended by the portion was given (drawing 7 (B)).

[0084] Since a center section will be expanded and it will sway and indicate by amendment, while a contracted picture refers the whole visual field if constituted as mentioned above Although the center section where a main object (photographic subject by which deflection amendment was carried out) exists is observed in detail, it is convenient, and if a reduction display part change function is prepared further and existence, a position, size, etc. of a reduction display are made selectable, convenience will increase more. In addition, what is necessary is just to return to electronic deflection amendment of the form of the 1st operation at the time of a photographing start to acquire the picture which does not have a deflection to a periphery as an image shot.

[0085] In the form of the above operation, [the image recording part 8 / a record means given in Claims] [the image display part 10 / the 1st amendment means given / the optical deflection amendment part 3 / in a display means given in Claims at Claims] [the 2nd amendment means given / the electronic deflection amendment part 7 / in Claims / the whole control part 13 / the control means of a description at Claims] [the image sensor 4 / the image pick-up means given / the imaging lens 1 / in an image pick-up means given in Claims at Claims] [the photography preparation switch 16 / a photography preparation directions means given in Claims] [the photographing start switch 17 / a photographing start directions means given in Claims] A non-illustrated shutter release member for the deflection detection means given [the angular velocity sensor 19] in Claims The operation means of Claims, Or the image display switch 15 is equivalent to the photographing field angle adjustment device are given [the lens control part 2] in the dc-battery check means given [the voltage detecting element 12] in a display instruction means given in an application for patent at Claims an adjustment device at Claims at a shutter release member, respectively.

[0086] Although the above is the response relation between composition given in Claims, and the form of operation, this invention is not restricted to the form of the above operation, and if the function shown by the claim or the function which the composition of the form of operation has can be attained, no matter it may be what thing, it is applicable.

[0087] For example, [or] although he is trying to change whether the operation start of the optical deflection amendment part 3 is carried out in the stage where the photography preparation switch 16 was operated, in the form of the above operation, or an operation start is

carried out in the stage where the photographing start switch 17 was operated according to the state of the voltage of a power supply battery. This is not based on supply voltage but is good as for only either coming out.

[0088] Moreover, in the form of the above operation, although it is made to perform the change of the optical deflection amendment part 3 and the electronic deflection amendment part 7 according to the operation state of the photography preparation switch 16, according to mode change-over switches, such as display mode and record mode, you may be made to perform this.

[0089] Moreover, when supply voltage is under the 2nd fiducial point, it is made to take a photograph by operating the electronic deflection amendment part 7, but you may make it this not operate the electronic deflection amendment part 7 in the form of the above operation.

[0090] Moreover, in the form of the above operation, although he is trying to judge the level of a drive power supply with voltage, even if this judges the level of a drive power supply by other methods, such as current, this invention is applicable.

[0091] Moreover, this invention receives an image shot and a display image by another optical path, and a display image sways and you may make it an image shot be an optical deflection amendment part, and amend it in an electronic deflection amendment part. In this case, even after carrying out an operation start in an optical deflection amendment part, an electronic deflection amendment part is made to operate as it is.

[0092] Moreover, an optical deflection amendment part and an electronic deflection amendment part are not what is restricted to the thing of the form of the above operation. For example, optical deflection amendment equipment may amend a picture deflection, or you may make it electronic deflection amendment equipment amend the deflection of a picture according to the detection result of an angular acceleration detector, an angular velocity detector, or an angular displacement detector according to the motion vector of a picture.

[0093] Moreover, the above soft composition and hard composition of the form of operation can be replaced suitably.

[0094] This invention seems moreover, to become the element which constitutes equipment, even if it seems that it combines with other equipment even if the whole composition of a claim or the form of operation or a portion forms one piece of equipment.

[0095] Moreover, the camera with which a video movie camera, a video still camera, and a silver halide film are used for this invention, the taking lens which is not included or an optical deflection amendment part is included -- cameras of various forms, such as attachment and detachment, an exchangeable camera, a single-lens reflex camera, a lens shutter camera, and a surveillance camera, -- further It is applicable further also to media, such as imaging devices other than a camera, Optical Apparatus Sub-Division and other equipment, these cameras, an imaging device, Optical Apparatus Sub-Division and the equipment applied to other

equipment, a method, and a storage in which computer reading is possible, and the element which constitutes these.

[0096]

[Effect of the Invention] As explained above, when recording a photographic subject image according to this invention When displaying a photographic subject image in the state where amend the deflection of a photographic subject image optically and a photographic subject image is not recorded Since picture signal processing amends the deflection of a photographic subject image, without amending the deflection of a photographic subject image optically, at the time of the image observation before photography while being able to lessen power dissipation by deflection amendment of a photographic subject image, at the time of photography, a high definition photographic subject image is recordable -- with -- **** -- little power dissipation can perform deflection amendment of a picture effectively.

[0097] Furthermore, according to this invention, the high definition photographic subject image by optical deflection amendment is observable before photography by starting deflection amendment of a photographic subject image optically in a photography preparatory step.

[0098] Furthermore, since only deflection detection operation for optical deflection amendment is started in a photography preparatory step according to this invention, without performing optical deflection amendment It can prevent missing shutter timing, being able to start optical deflection correction operation without a time lag at the time of a photographing start, and lessening power dissipation more, even if it is the case where deflection detection preparation takes time.

[0099] Furthermore, according to this invention, according to the level of a drive power supply, suitable deflection amendment in consideration of power dissipation can be performed.

[Translation done.]